

**SECTION 01 81 19**

**INDOOR AIR QUALITY REQUIREMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section includes requirements to create and implement a construction indoor air quality management plan to maintain indoor air quality by controlling dust and pollutants.

**1.2 RELATED WORK**

- A. Section 01 00 00 - GENERAL REQUIREMENTS.
- B. Section 01 33 33 - ENVIRONMENTAL SUBMITTALS.
- C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS.
- D. Division 02 through 34. Individual sections that involve finish materials. This includes, but is not limited to, adhesives, sealants, paints, primers, carpets and composite wood products.

**1.3 REFERENCES**

- A. Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 1995.
- B. Filtration media: ASHRAE 52.2-1999.
- C. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168 requirements.
- D. Topcoat Paints: Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.
- E. All other Architectural Coatings, Primers and Undercoats: Regulation 8, Rule 51 of the Bay Area Air Quality Management District (January 7, 1998).
- F. Carpet, carpet cushion, carpet adhesive: Carpet and Rug Institute's Indoor Air Quality Green Label Program and Testing Procedure.
- G. Indoor Air Quality Testing: United States EPA Protocol for Environmental Requirements, Baseline IAQ and Materials, for the Research Triangle Park Campus, Section 01445.

**1.4 REQUIREMENTS**

- A. Develop and implement an Indoor Air Quality Management Plan during construction that meets or exceeds the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3. The required Best Management Practices (BMP) are summarized in Part 3 of this Section.
- B. Protect stored on-site or installed absorptive materials from moisture damage.

- C. Use specific filtration media at each return air grill during construction, after construction, during flushout and prior to occupancy as outlined in Part 2 - Products.
- D. Use low- or no-emitting adhesives, sealants, paints, primers, carpets and composite wood products within the vapor barrier.
  - 1. Product requirements are specified in Divisions 02-34.
  - 2. Where specific products are not called out, refer to the Requirements within this Section.
- E. Conduct a building flush-out or a baseline indoor air quality test procedure consistent with Part 3 of this Section and Division 01 Section "Sustainable design Requirements."
  - 1. Include a separate milestone date on the CPM Schedule that indicates targeted date for the start of building flushout process.

#### **1.5 SUBMITTALS**

- A. IAQ Management Plan: Within 60 working days after receipt of Notice of Award of Bid, or prior to HVAC work, whichever occurs sooner, the Contractor should submit 3 copies of the Draft IAQ Management Plan to the Resident Engineer for approval.
  - 1. The Draft Plan must meet or exceed the SMACNA Best Management Practices described in Part 3 of this Section.
  - 2. In the Plan designate an on-site party (or parties) responsible for instructing workers and overseeing and documenting results of the IAQ Management Plan for the Project.
  - 3. Once the Resident Engineer has determined which of the BMPs contained in the above draft Plan are acceptable, submit, within 14 working days, a Final IAQ Management Plan. Distribute copies of the IAQ Management Plan to the Job Site Foreman, each Subcontractor, the Resident Engineer and the Professional.
- B. IAQ Management Reports: Submit with each Progress Report a summary of IAQ Management issues. The Summary shall be submitted on a form approved by the Resident Engineer.
- C. Provide a minimum of 18 photographs (3 each on 6 separate occasions), along with a brief description of the SMACNA approach employed, documenting construction IAQ management measures such as protection of ducts and on-site stored or installed absorptive materials.
- D. Provide cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.

**PART 2 - PRODUCTS**

**2.1 PRODUCT REQUIREMENTS**

- A. If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill.
- B. Use low-emitting adhesives, sealants, paints, primers, carpets and composite wood products within the vapor barrier. This includes, but is not limited to:
  - 1. Low or no-VOC adhesives and sealants such as
    - multipurpose construction
    - glazing
    - pvc
    - carpet and pad
    - sheet flooring
    - tile floor
    - wood floor
    - cove base
    - countertop
    - tile countertop
    - grout sealant
    - cabinetry
    - laminate
    - sub-base
    - ductwork
    - fire caulk
    - acoustical
    - plumbing.
  - 2. VOC maximum limits are as follows:
    - Adhesives, sealants and sealant primers.

<b>Architectural Applications</b>	<b>Voc Limit [g/L less water]</b>	<b>Specialty Applications</b>	<b>VOC Limit [g/L less water]</b>
Indoor Carpet Adhesives	50	PVC Welding	510
Carpet Pad Adhesives	50	CPVC Welding	490
Wood Flooring Adhesives	100	ABS Welding	325
Rubber Floor Adhesives	60	Plastic Cement Welding	250
Subfloor Adhesives	50	Adhesive Primer for Plastic	550
Ceramic Tile Adhesives	65	Contact Adhesive	80
VCT & Asphalt Adhesives	50	Special Purpose Contact Adhesive	250
Drywall & Panel Adhesives	50	Structural Wood Member Adhesive	140
Cove Base Adhesives	50	Sheet Applied Rubber Lining Operations	850
Multipurpose Construction Adhesives	70	Top & Trim Adhesive	250
Structural Glazing Adhesives	100		
<b>Substrate Specific Applications</b>	<b>VOC Limit [g/L less water]</b>	<b>Sealants</b>	<b>VOC Limit [g/L less water]</b>
Metal to Metal	30	Architectural	250
Plastic Foams	50	Nonmembrane Roof	300
Porous Material (except wood)	50	Roadway	250
Wood	30	Single-Ply Roof Membrane	450
Fiberglass	80	Other	420
<b>Sealant Primers</b>	<b>VOC Limit [g/L less water]</b>		
Architectural Non Porous	250		
Architectural Porous	775		
Other	750		

## Aerosol Adhesives

<b>Aerosol Adhesives</b>	<b>VOC weight [g/L minus water]</b>
General purpose mist spray	65% VOCs by weight
General purpose web spray	55% VOCs by weight
Special purpose aerosol adhesives (all types)	70% VOCs by weight

## Paints and Coatings

- 1) Architectural paints, coatings and primers applied to interior walls and ceilings: Do not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.
  - a) Flats: 50 g/L
  - b) Non-Flats: 150 g/L
- 2) Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Do not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.
- 3) Clear wood finishes, floor coatings, stains, and shellacs applied to interior elements: Do not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.
  - a) Clear wood finishes: varnish 350 g/L; lacquer 550 g/L
  - b) Floor coatings: 100 g/L
  - c) Sealers: waterproofing sealers 250 g/L; sanding sealers 275 g/L; all other sealers 200 g/L
  - d) Shellacs: Clear 730 g/L; pigmented 550 g/L
  - e) Stains: 250 g/L
- 4) Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
- 5) Restricted Components: Paints and coatings shall not contain any of the following:
  - a) Acrolein.
  - b) Acrylonitrile.
  - c) Antimony.
  - d) Benzene.
  - e) Butyl benzyl phthalate.
  - f) Cadmium.
  - g) Di (2-ethylhexyl) phthalate.
  - h) Di-n-butyl phthalate.
  - i) Di-n-octyl phthalate.
  - j) 1,2-dichlorobenzene.
  - k) Diethyl phthalate.
  - l) Dimethyl phthalate.

- m) Ethylbenzene.
  - n) Formaldehyde.
  - o) Hexavalent chromium.
  - p) Isophorone.
  - q) Lead.
  - r) Mercury.
  - s) Methyl ethyl ketone.
  - t) Methyl isobutyl ketone.
  - u) Methylene chloride.
  - v) Naphthalene.
  - w) Toluene (methylbenzene).
  - x) 1,1,1-trichloroethane.
  - y) Vinyl chloride.
3. Carpet systems, including carpet cushion installed in the building, must meet or exceed the requirements of the Carpet and Rug Institute's Green Label Plus Indoor Air Quality Test Program. Carpet adhesives must meet the VOC limit requirements stated above (50g/L).
4. Composite wood and agrifiber products, including core materials must contain no added urea-formaldehyde resins.
- a. Adhesives used in field and shop-fabricated assemblies containing these products must contain no urea-formaldehyde.
  - b. Products may include but not limited to millwork, composite and solid doors, cabinetry, crown moldings, wood paneling and built in furnishings.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Many Best Management Practices are available to maintain IAQ during construction or demolition. The pros, cons, and limitations of each available option should be considered to identify the most effective and most efficient approaches for a particular job. When designing the Plan, more than one of these practices may be used simultaneously or phased in) as work progresses. In general, the steps include:
- 1. Containing the work area
  - 2. Modifying HVAC operation
  - 3. Reducing emissions
  - 4. Intensifying housekeeping
  - 5. Scheduling material delivery to avoid contamination

6. Protecting stored and installed absorptive materials from contamination.

### 3.2 REQUIRED IAQ MANAGEMENT BMPS

#### A. Mechanical Systems

1. Protection: All HVAC equipment must be protected from collecting dust and contaminants that can be collected in the system and later be released. Specific HVAC protection requirements generally apply to the return side, central filtration, or supply side of the system.
2. Return Side: The return side of an HVAC system is, by definition, under negative pressure and thus capable of drawing in nearby construction dust and odor. Special attention must be paid to the location of any return vents, return ducts, ceiling plenums, return shafts, VAV plenum intakes, window units, and transfer vents as well as that portion of the air handler which is upstream of the central fan. When possible, the entire system should be shut down during heavy construction or demolition that generates dust and airborne particles.
  - a. All return system openings in or immediately adjacent to, the construction area should be sealed with plastic.
  - b. When the system must remain operational during construction, temporary filters should be added where necessary (e.g., on grills to return air shaft). Filters used during construction must have been installed as specified in Part 2-Products and must receive frequent periodic maintenance.
  - c. Replace filters at end of project with filters required by Part 2-Products. Verify that equipment is capable of accepting these filters, or notify the Resident Engineer.
  - d. When the general system must remain operational, the heaviest work areas should be dampered off or otherwise blocked if temporary imbalance of the return air system does not create a greater problem.
  - e. The mechanical room should not be used to store construction or waste materials.
3. Supply Side:
  - a. Diffusers, terminal units, and ducts may be adequately protected in most cases where the above measures are implemented. When the system is off for the duration of construction, diffusers and

window units should also be sealed with plastic for further protection.

- b. Ducts, diffusers, and window units should be inspected upon completion of the work for the amount of deposited particulate present and cleaned where needed. If significant dust deposits are observed in the system during construction, some particulate discharge can be expected during start-up. When such a discharge is only minor, delaying re-occupancy long enough to clean up the dust may be sufficient. In more severe cases, installing temporary coarse filters on diffusers or cleaning the ducts may be necessary. The condition of the main duct should be checked whenever visible particles are discharged from the system.
- B. Materials Handling: Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other pollutants.
1. The design of each system must be evaluated in detail to determine how it may be affected by odor and dust from the project (including site egress, staging areas, etc.).
  2. Designate receiving/storage areas for incoming material to be delivered according to installation schedule and to be placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
  3. Protect stored on-site or installed absorptive materials from moisture damage.
  4. Hazardous wastes shall be separated, stored, and disposed of according to local regulations.
  5. Schedule delivery of materials to minimize the duration of on-site storage.
- C. VOC Control: Schedule installation of materials to minimize contamination of absorptive materials with VOCs, solvents, dust, etc. (For example, install carpet after painting has been completed, since carpet can absorb VOCs released while the paint dries).
1. All dry furnishings and materials (such as carpet, floor tile, acoustical tile, textiles, office furniture, wood shelving, etc.) shall be allowed to "air-out" or pre-condition prior to installation.



2. "Bake-outs" of furnishings and construction materials is not recommended due to questionable effectiveness and potential for damage.
  - a. Reduce exposure to VOCs as follows:
  - b. An enclosed tanker is preferable to an open kettle for roofing.
  - c. Containers of wet products should be kept closed as much as possible.
  - d. Waste materials that can release odor or dust should be covered or sealed.
  - e. Applying a sealer may control a surface that is persistent odor source.
- D. Inspection: Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection.
  1. Ductwork and appurtenances should be inspected upon completion of the work for the amount of deposited particulate present and cleaned where needed.
  2. Both highly specialized equipment and professional expertise may be required to ensure that dust is effectively removed and contained.
  3. The sequence in which duct cleaning occurs in the overall construction process needs to be carefully considered to avoid recontamination.
- E. Modifying Equipment Operation: Use of equipment may need to be restricted in order to meet IAQ objectives. This could involve substituting cleaner equipment or simply changing operating Procedures. Examples of such controls include:
  1. Restricting traffic volume or prohibiting idling of motor vehicles where emissions could be drawn into occupied areas.
  2. Switching from diesel to biodiesel or bottled gas for equipment such as generators or fork lifts (emissions are cleaner but still potentially harmful under some circumstances). Use of electric fork lifts and other equipment should be considered when feasible, since they do not burn fossil fuels, thus eliminating exposure to combustion gas emissions.
- F. Use low-toxic cleaning supplies for surfaces, equipment and worker's personal use. Options include Green Seal, citrus-based or soy-based solvent cleaners.
  1. Refer to Green Seal website for a list of approved products at [www.greenseal.org/certproducts.htm](http://www.greenseal.org/certproducts.htm)

- G. Changing Work Practices: For some demolition tasks (e.g., paint stripping) there may be techniques available that produce less airborne dust. Some painting techniques release fewer odors. Some cleaning practices raise less dust.
- H. Use wet sanding for gypsum assemblies. Exception: Dry sanding allowed subject to Owner approval of the following measures.
1. Full isolation of space under finishing.
  2. Plastic protection sheeting is installed to provide air sealing during the sanding.
  3. Closure of all air system devices and ductwork
  4. Sequencing of construction precludes the possibility of contamination of other spaces with gypsum dust.
  5. Worker protection provided.
- I. Local Exhaust: Pollution sources can be directly exhausted to the outside. This may be done through an exhaust system already available in the building or more often by a portable fan vented to the outside and attached to the work site by flex duct. Depending on the nature of the material and the location of the exhaust, special filtration of the exhaust may or may not be necessary. Any emissions to the outside must be in compliance with applicable regulations and should be directed well away from intakes.
- J. Air Cleaning: Where exhaust is not feasible, local re-circulation of air through a portable air cleaner may be effective. The type of filter should be suitable for the material being controlled (e.g., charcoal or potassium permanganate for many odors, a moderate to high efficiency filter for dust).

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